

REMARKS

The above amendment with the following remarks is submitted to be fully responsive to the Official Action of September 19, 2002. Reconsideration of this application in light of the amendment and the allowance of this application are respectfully requested.

Claims 1-13 were pending in the present application prior to the above amendment. In response to the Office Action, the originally filed claims 1-13 have been canceled and new claims 14-26 have been added by amendment. Therefore, claims 14-26 are now pending in the present application and are believed to be in proper condition for allowance.

Initially, in the Office Action, the Examiner objected to the Specification stating that page 4 is unclear. In response, the paragraphs of page 4 has been amended herein to more clearly describe the limitations of the prior art.

Referring again to the Office Action, the applicants acknowledge with appreciation the Examiner's indication of allowable subject matter in claims 4-6 if amended to be in independent form including all the limitations of the base claim and any intervening claims. In response, independent claim 14 which corresponds to the combination of claims 1 and 4 has been added, claim 14 including all the limitations of claim 4 and its base claim 1, as well as including amended language to overcome the Examiner's rejection of claim 4 under 35 U.S.C. 112 in paragraph numbers 8 and 9 of the Office Action. Therefore, allowance of claim 14 is respectfully requested.

In addition, dependent claims 15-18 that are dependent on independent claim 14 have been added by the above amendment, claims 15-18 corresponding to canceled claims 2, 3, 5, and 6, respectively, but with amended language to overcome the Examiner's rejection of claims 3 and 5 under 35 U.S.C. 112 in paragraph numbers 6, 7 and 10 of the Office Action. Because these claims are dependent on the new independent claim 14

which the Examiner has indicated as being allowable, these claims are also believed to be in proper condition for allowance and notice to that regard is respectfully requested.

Referring again to the office action, claims 1-3 were rejected under 35 U.S.C. 102(b) as being anticipated by Hook (USP 4,046,601). In addition, claims 7-13 were rejected under 35. U.S.C. 103 as being unpatentable over Hook in view of various references including Duley (USP 6,426,153), Kurita (USP 6,083,455), Futaki (JPO 02066255) and/or Chadwick (USP 5,908,065). These rejections are believed to be rendered moot since claims 1-13 have been canceled by the above amendment. Therefore, the applicants respectfully request the withdrawal of these rejections as set forth in paragraph numbers 13-21 of the Office Action.

In addition, as previously noted, new claims 19-26 have also been added by the above amendment. In this regard, according to a method for producing a formed member for vehicle body as claimed in the new independent claim 19, it is now possible to sufficiently ensure the plastic formability such as press forming before nitriding treatment in producing a formed member for vehicle body by making the tensile strength of the steel material 500 MPa or less. In particular, by making the average hardness in the sheet thickness direction of the resultant steel sheet member after nitriding treatment Hv 300 or more, it is possible to obtain a formed member for vehicle body with a high tensile strength so that significant economic benefit can be obtained. More specifically, the method as now claimed allows the sheet thickness to be made thinner, and also eliminates the necessity for reinforcing members. This results in reduction of body weight and material cost, and also results in elimination of mold costs and assembly processes thereby significantly increasing the economic benefit offered by the present invention. Furthermore, by setting the difference in hardness between the surface part and the inside center part in the sheet thickness direction of the steel sheet to Hv 200 or less, it is possible to avoid dramatic decreases of the tensile strength and elongation to achieve more stable strengthening of the vehicle body member.

The applicants respectfully contend that the present invention as claimed in the newly added claim 19 is in proper condition for allowance since the references relied upon by the Examiner in the Office Action, either alone or in combination, fail to disclose, teach or otherwise suggest the method claimed in claim 19. Therefore, allowance of this claim is respectfully requested.

The newly added claim 20 is dependent on claim 19 discussed above and includes a limitation reciting that the difference in elongation property between the first blank material and the second blank material is set within a predetermined range. The support for this limitation is set forth in the Detailed Description section of the application. (See Page 69, lines 15-18 of the application).

The newly added claim 21 is dependent on claim 19 discussed above and includes a limitation reciting that the foam material is set by adhesion to at least a region subjected to nitriding. The support for this limitation is set forth in the Detailed Description section of the application. (See Page 75, lines 16-17 of the application).

The newly added claim 22 is also dependent on claim 19 discussed above and also includes limitations reciting that the preform has a pipe-like shape, and that pressurized fluid performs plastic forming on the preform to obtain the formed member. The support for these limitations is set forth in the Detailed Description section of the application. (See Page 84, lines 15-16 and Page 85, lines 6-10 of the application).

The newly added claims 23-26 are apparatus claims that correspond to the newly added methods claims 19-22 discussed above, and thus, these claims are believed to be in proper condition for allowance as well.

In view of the above, the applicants contend that the new claims 14-26 are in proper condition for allowance and notice to that effect is respectfully requested. However, to facilitate the Examiner's examination of the newly added claims 19-26, the prior art references relied upon by the Examiner in the Office Action relative to the now canceled claims 1-13 are discussed in detail below to distinguish these references from the present invention of claims 19-26.

In the above regard, the primary reference to Hook relied upon by the Examiner in the Office Action discloses producing stamped or drawn parts from highly formable steel containing a nitriding element. The reference discloses that the untreated steel has tensile strength 500 MPa or less, and after nitriding treatment, the steel has a hardness of Hv 300 or more by Vickers hardness. However, the Hook reference does not teach when the nitriding treatment is performed, i.e. before or after forming. In addition, the Hook reference does not teach the method for producing a formed steel member for vehicle body or a formed steel member for vehicle body produced by the method disclosed. Accordingly, Hook reference does not disclose, teach, or otherwise suggest the present invention described in new independent claims 19 and 23.

The Duley reference discloses a tailored blank made by welding a pair of parts such as sheet metal together, and also further discloses that the formed component can be used in the automobile industry. However, the Duley reference does not teach the basic process of the present invention in which a nitriding treatment is performed on a vehicle body member after plastically forming a steel sheet to a formed member for vehicle body as claimed in new independent claims 19 and 23. Furthermore, Duley reference does not disclose, teach, or otherwise suggest the limitations of dependent claims 20 and 24.

In particular, since a specific part of the formed member obtained by the plastic forming is hardened by the nitriding treatment after plastic forming the preform (which has been formed by joining the first blank material and the second blank material having different elongation properties) as taught in the present application, it is possible to sufficiently ensure the plastic formability before heat treatment. The nitriding treatment performed after plastic forming thus provides the specific part of the formed member with a desired strength. That is, by applying the tailored blank method, it is possible to obtain a formed steel member for vehicle body having a part therein is sufficiently stronger than other parts, while improving yield of the sheet-like material.

The Kurita reference discloses that a nitriding treatment is performed on a steel part such as a crankshaft, for example, after machining. However, Kurita reference does

not relate to a method for producing a formed member made of a steel sheet for a vehicle body.

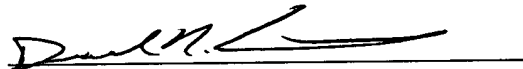
The Futaki reference discloses a building panel made of steel provided with a recessed hollow portion on its back face. A nitriding treatment and an oxidization treatment are performed on the steel panel, and thereafter, a resin foam layer is provided in the recessed hollow portion thereof. The present invention as claimed in new dependent claims 21 and 25 is distinguishable because the nitriding treatment is performed on at least a predetermined region of the formed member after forming a formed member having a closed section shape, setting a foam material by adhesion to this predetermined region, the foam material being caused to expand by heating the formed member so that the foam material is expanded and hardened with respect to the predetermined region. It is possible to obtain much higher adhesive properties in accordance with the present invention than when the steel sheet is not subjected to a heat treatment. Thus, in reinforcing the formed member by filling it with the foam in accordance with claims 21 and 25, it is possible to allow the foam to be fixed to the formed member relatively simply, and to obtain a high reinforcing effect by filling it with the foam. The Futaki reference, alone or in combination with other references of record, does not disclose, teach, or otherwise suggest the above-mentioned aspects of the invention as recited in the new dependent claims 21 and 25. Therefore, allowance of these claims is also respectfully requested.

The Chadwick reference discloses a casting method. Thus, the applicants respectfully contend that the present invention as set forth in the new dependent claims 22 and 26 are clearly patentable over Chadwick in combination with the above references of record, especially in view of limitations reciting that the perform has a pipe-like shape, and that the pressurized fluid plastically forming the perform as previously discussed.

In view of the foregoing, it is submitted that the present application is in condition for allowance and a notice to that effect is respectfully requested. However, if the Examiner deems that any issue remains after considering this response, he is invited to

call the undersigned to expedite the prosecution and work out any such issue by telephone.

Respectfully submitted,



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VERSION WITH MARKINGS SHOWING CHANGES MADE

In the Specification:

Page 3, line 13:

This nitriding treatment essentially aims at improving the abrasion resistance of the surface part while restricting increase of the inside hardness of the member and ensuring its toughness, and does not intend to improve the strength of the whole member. However, in recent years, from the view of ensuring concurrently both reduced weight and strength/rigidity of the vehicle body, consideration is made to apply surface heat treatment techniques including such a nitriding treatment on structural members and reinforcing members for an automobile. For example, Japanese Unexamined Patent Laid-Open Publication HEI 11-279685 discloses that for the purpose of producing a high-strength press formed member having excellent impact absorptivity with satisfactory dimensional accuracy and a low production cost, a [nitriding] steel sheet of a specific composition is subjected to a nitriding treatment after press work is completed.

Page 4, line 5:

[However] Thus, in the above prior art, [even though] an effort is made to improve the strength of a steel sheet itself while ensuring press formability by subjecting the nitriding steel sheet to a nitriding treatment after being press formed[, in]. In practice, however, the strength (tensile strength) obtained after the nitriding treatment[, which] is around 700 MPa [at the] maximum[, which is not [still] satisfactory[, and hence] Therefore, it [was impossible] is not possible to obtain a significant [effect in respect of] reduction of [body] weight and [reduction of] production cost solely using the teachings of Japanese Unexamined Patent Laid-Open Publication HEI 11-279685.

Page 4, line 15:

[By the way, in] To improve the performance of the vehicle in protecting passengers during a collision, [a case where] the structural strength [is] of the vehicle may be improved by increasing the thickness of the steel sheet used to form body panel member and structural member of the vehicle. [in order to improve the passenger protecting performance at the time of a collision of the vehicle] However, [it is not preferred to increase] this method of increasing structural strength by increasing the sheet thickness of such body parts and structural members [in which attribution with respect to] is not preferred if such method does not significantly increase the rigidity of the whole body [is relatively low, in view point of reducing] since vehicle body weight and [lower] the production cost is increased.

Page 4, line 25:

Therefore, it is [not uncommon to be desired] desirable to provide a one-piece press formed member having portions with [portion having] different properties from other portions of the formed member which may be, for example, [in] a body panel member [and] or a structural member [to be obtained originally as one-piece press formed member].